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ABSTRACT

Instructional technology has dramatized the need for a complete overhaul of educational systems; tacking on "innovations" will not do. The grip of dead tradition on education must be pried loose. Process, rather than content, should be stressed in learning. The challenge for instructional technology, as for education in general, is to devise an approach to education that aims at the growth of the students, not of test scores. Its aim should be to make education a democratic process wherein students learn by doing, and learning is closely allied to the working and needs of the community, and the needs of the students. The use of technology in the Philadelphia Parkway program is a major move in the right direction. The Crane study stresses the role of the neighborhood in the planning of a school, the school being blended into the contours and overall physical development of the neighborhood. The Medial Wheel, the 12th and Oxford Street Gang, and Gaming, all describe this recommended approach to education. (GO)

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Sketching a Context for Instructional Technology

by Richard H. de Lone *

An Overview (and not necessarily about Philadelphia)

The historians will have to tell us what the age of the computer (and its technological compatriot, TV) means. But if the future will have the last word, we have to try to guess now. At least we have to keep in mind the alternatives. In no instance is this truer than in the technologizing of education.

To start with sweeping generalities, there seem to be at least three possible societal outcomes of the computer age. Each has tremendous implications for education.

The most uncomfortable thought is that the computer will simply clinch the industrial revolution -- and thus escalate the crises in dehumanization which poets and (now particularly) young people, have been decrying since Goldsmith wrote "The Deserted Village". Thus it is that some perceive the prophets of the "technetronic age" as devils surrounded by demons of quantification, reductio ad statistic, and amorality. The end product would be programmed man -- men who can't be folded, spindled or mutilated and who can't love either. This would be the most frightening kind of totalitarianism. Presumably this is where the pervasive if unsophisticated fretting about the computer "taking the place of the teacher" gets its strength.

There is a more optimistic view, typified by the McLuhanists, that the computer and other media are harbingers of revolutionary new ways of relating, preceiving and being in the world. A less romantic way to

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put it is to borrow the notion of paradigms from T. S. Kuhns, and suggest that computer technology, in ways not yet actively clear to us, will provide a new way of structuring reality and hence a new reality.[1] George Leonard, in his book Education and Ecstasy, seizes on these possibilities in portraying the school of the future as an electronic phantasmagoria. (It is our view that there is a lot more of educational value in Leonard's fantasy than in the drudgery of, say, Individually Prescribed Instruction which might be called the pedagogic equivalent of shredded wheat: knowledge broken into easily digestible bits.) But there is comparatively little thinking, and there are comparatively few dollars, being invested to permit instructional technology to match Leonard's enthusiasm.

A third possibility is that the computer revolution should not be judged in either quantitative and qualitative terms. Rather, it may render such categories useless, or, if not useless, produce quantitative changes which ultimately become qualitative. Quite simply, this means that the computer as a "mind expander" (in the non-psychedelic sense) be vastly improving memory and speed of logic will enable understandings and problem solvings and discoveries and operations in minutes that the human brain by itself takes years to do. As a result, the sense of time itself will be changed, and life, inevitably, with it.

Call the Impacts A, B, and C. Let them sit for a minute and come back to here, now and instructional technology as it exists. Or rather, instructional technology as its present state can be charicatured.

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[1] Cf. Kuhns, The Structure of Scientific Revolutions, University of Chicago Press.

The first thing to be said is that precious little effort is being made to establish any cosmic context for the development of an educational technology. Rather, we are, to crib from McLuhan, looking through the rear view mirror and taking definitions, goals, and assumptions about education from the factory-world in which, for which, and in the image of which public schools were created.

Computer applications to instruction seem particularly geared to making the old ways more efficient, to improving the assembly line. Computer Assisted Instruction becomes the ne plus ultra of remedial education. And remedial education, too often, can be defined as an effort to pour into a student in concentrate what he has already rejected in diluted form. Most efforts at programmed learning, and their refinement into CAI, seem to adopt wholesale this pernicious assumption.[2]

This approach to computerized instruction has its parallel in the pervasive use (or misuse) of TV as a medium for presenting lectures. The assumption that seems to underly most instructional TV is that a jazzy packaged lecture is better than a dull live lecture. There are three big problems with this assumption. First is that TV may be unsuited, as a medium with peculiar characteristics of its own, to the presentation of lectures at all. Secondly, instructional lectures are rarely jazzy. Neither the talent or the money needed are there to do a lecture as well

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[2]The author of this paper was once horrified when the teacher of a CAI biology course said, "This is fine for my bright students. But I don't use it with my slow ones. What they need is more drill in the old method." On second thought, however, he may be right, for CAI has many of the earmarks of fast drill.

as, say, a commercial (which, it might be added, seems to be the form which best exploits the nature of the medium). And thirdly, lectures are perhaps the least useful and least effective vehicles for educating anyone about anything. But that kind of truism we shrug off easily.

Both instructional TV and CAI, then, as they are usually practiced, perpetuate without serious examination (and at considerable cost) anachronistic notions and processes of education. They accord the student a passive role; they arbitrate content for him (assuring that it is mere accident when the content is useful or relevant in his eyes). The stuent is restricted to absorbing data. He does not generate it; nor does he generate and explore issues, ways of being, or ways of thinking. It is doubtful that anyone ever learned much this way. But it is becoming increasingly clear that education which consists primarily of transfering data from one receptacle to another is useless. It is useless in part because there is too much data around, and it grows obsolete too quickly. And it is useless because it does not help the student learn how to process data, or help him learn how to learn.

If it is true, as Kenneth Boulding has suggested, that we have entered the era of operations overload, then information no longer is power. It is a swamp. But pattern recognition, as a way to handle information, is essential. Patterning becomes power. Electronic media all rely on patterning. And this should be taught, rather than using media to further overload students.

Indeed, most efforts at instructional technology have ignored the growing body of evidence and theory which points to the importance of process, as opposed to content, in learning. All John Holt is saying in How Children Fail is that, in schools, the medium really is the message.

In an authoritarian classroom, or school, or system of schools, grades, rote learning and pleasing the teacher are the real "curriculum". Kids learn in varying degrees how to get good grades, how to parrot the teacher or how to ingratiate themselves. (Or else, they turn off.) They certainly don't learn how to think, cope, feel, express or analyze.

Is it not equally possible that a generation raised on the current varieties of CAI, ITV and all those other acronyms will grow up thinking that knowledge comes in small bits? And will only be able to think in small bits?

A visitor to Philadelphia's CAI biology project in its early days observed the following:

Six high school pupils sat before six consoles, scratching away with their styli. They were obviously absorbed in their work. Suddenly, all the screens went blank. "Mr. _____," they chorused. "It's gone off again." The teacher, with some embarrassment, explained something about bugs in the system and the program not being adequately pre-tested. He disappeared into a back room to consult with a technician. A few moments later, the consoles flickered back on. The kids resumed scratching away with their styli. Minutes passed. The consoles went blank again. "Mr. _____," came the chorus. "It's gone off again." The teacher disappeared into the back room. In a few moments, the consoles flickered on. The kids resumed scratching...

Precisely <u>because</u> the process was not working, it was obvious that the process was the source of fascination to the students. They did not discuss biology during the breakdowns. Rather, they stared blankly at the blank screens, reduced to utter passivity. (Godammit, Martha, will you fix the picture.")

The challenge for instructional technology, as for education in general, is to devise and institutionalize an anti-institutional approach to education: an educational program that aims at the growth of students, not of test scores; growth in their ability to explore, to discover both themselves and the world around them and make connections between the two. This means making students active participants in education; it means changing the one-way authoritarian relationship which prevails in most classrooms between instructor (whether teacher or programmed instruction or machine) and student. It means making the teacher's role catalytic, not prescriptive. It means changing those structures in school systems and bureaucracies which force teachers into rigid, non-growing roles, and shut parents out of their children's classrooms. It means changing both the content and process of most curriculum. It means taking seriously cliches about the complex, fluid, constantly changing, constantly shrinking world we increasingly inhabit, and doing something to relate the process of education to that reality.

Marshall McLuhan suggests that the new technologies are themselves instrumental in defining to today's youngsters what is real and what is relevant. Describing the effects of weaning on TV, McLuhan suggests:

"The young today reject goals. They want roles. R-O-L-E-S. That is, total involvement. They do not want fragmented or specialized goals or jobs. We now experience simultaneously the drop-out and the teach-in. The two forms are correlative. They belong toghether. The teach-in represents an attempt to shift from instruction to discovery, from brainwashing students to brainwashing instructors. It is a big, dramatic reversal. The drop-out represents a rejection of nineteenth century

technology as manifested in our educational establishments. The teach-in represents a creative effort, switching the educational process from package to discovery."[3]

Certainly if one accepts McLuhan's notion that it is the nature of television that "the viewer is the screen" (as opposed to movies in which "the viewer is the camera,") and accepts the pervasive influence of TV, then this basic challenge to educational assumptions is an important starting point in any consideration of instruction.

It is not enough, however, to challenge assumptions; the structures which tend to codify, rigidify and support anachronistic assumptions must be challenged as well. Joseph Grannis does just this while making some points not so far from McLuhan's in a recent issue of the Harvard Graduate School of Education Bulletin.

"Individuals," Grannis states, "find meaning and control in modern life, as in the life of any society, by participating in its social institutions -- political, economic, artistic, and so on -- or by rebelling against institutions which they understand are stupid or inequitable. Our problem, in essence, is that effective entry into most of the institutions of modern society is a great deal more complex than was entry into the institutions of pre-industrial society." (Or, one might add, pre-technetronic society.)

Grannis proceeds to argue that the current disconnection between schools and community, which is most marked in urban settings, must be altered. He suggests this means "community control" of schools, but

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[3] Understanding Media, New Directions.

not simply in the sense in which New York is embarking on community control. Rather, he argues that "community control of the schools should be conceived of in terms of a plurality of communities of interest, each having relatively greater control over that part of the school's program which it is competent to, and cares to, participate in."

Another way of saying the same thing is that the community (or communities) must be brought into the classroom -- or must become the classroom -- if the classroom is to connect with the real world; if it is to be relevant.

In terms, say, of vocational education, this has obvious ramifications. The laboratory approach has been too long restricted primarily to science. But a factory is a lab; a data processing center is a lab; a television studio is a lab if it is viewed as one and if it becomes available to students for learning. Indeed, to simply maintain the hardware which permits students to learn <u>vocationally</u> much useful about technology is too great a financial burden for schools. But the hardware is all around them in business and industry. Business and industry, if they want something as comparatively simple as a well-trained labor force, are going to have to get in the business of vocational-technical education for secondary school children. (This is exactly what is happening in Philadelphia's Parkway Program, which is described below.)

But first and foremost, the institutions of education, particularly in big cities where scale and bureaucratization have made them so remote, must connect to the realities of people's lives.

This means reexamining the institutional context in which education takes place; a context established by a variety of relationships --

between pupil and pupil, pupil and teacher, teacher and admimistrator -- and a variety of processes -- political, administrative, and educative. It also means examining the relationship of that context to both the world around it and the world that will be. To make such a reexamination, one does not simply call in experts.

Rather, expertise is gained through a process which itself becomes instrumental in recreating school systems. Philadelphia's superintendent, Mark R. Shedd, has suggested that there are at least four steps to this process:

"1) Listening to the students and their parents to discover what felt and/or perceived needs are not being met.

2) Joining with those students and parents to redefine education and develop programmatic responses to those needs.

3) Relating such responses directly to the reality of the students, which is to say the reality of American society, and particularly urban society.

4) Adopting an approach to instruction which is based on the above steps and which reflects full awareness of individual schools (and school systems) as social organisms in themselves."

The so-called Coleman Report, and other data, tell us that there is a direct relationship between a student's feeling of his ability to control his own destiny and his achievement. Certainly students are not going to have that feeling unless their parents feel they can have some impact on the school, and unless teachers feel they have some impact. Yet, we insist on maintaining bureaucratic, centralized structures which

by their very nature perpetuate authoritarianism, severely restrict participation of parents, teachers and students, and teach the lesson that somebody "up there" makes all the decisions. The process Shedd has described is both a step towards, and an outcome of, decentralizing the policy-making and the administrative decision-making of school systems; it is decentralization conceived of primarily not as a management tool, but as a way to free up the prime participants in education (pupil, parent, and teacher) and strike a blow at an authoritarian value structure which in itself is anti-educational. At its simplest, it means making education a democratic process.

Indeed, all these statements are cliches. They have been for some time. But they are cliches more honored in the breach, alas, than the observance. And to try to spell them out in any more detail would take more space than this paper permits.

The point is, that educators and capitalists alike will be delinquent if they plunge into the technologizing of instruction without first taking a hard look at where they are going, what their assumptions are, and what basic changes in the education system must be made if technology is going to make any real impact, any real difference for the students.

Big city school systems today are like old automobiles once the parts start to break down. It costs more to keep them going than to buy a new model. Tacking on a few innovations, getting a few new parts, adding some gimmicks won't do.

If the present system of education, with its anti-intellectual, anti-learning, anti-growth biases remains intact, and if instructional technology is simply used to buttress that system and its assumptions, then education

is on the verge of its greatest boondoggle. Money poured into the seive will accomplish nothing, just as the money poured into compensatory education -- which tinkers with but does not alter the machine -- has accomplished nothing.

There is real cause to suspect that exactly this may happen. The cost of computer systems is de-escalating rapidly. The sophistication of instructional approaches to technology gives little indication of rising as fast. As CAI, for instance, becomes economically feasible on a large scale, education may find itself locked once again into a new, technological self-perpetuating tradition of mediocrity. The basic blame will rest with the pedagogues who accept current mediocrities and are often hired to develop software. Corporations willing to turn all responsibility for content, process and educational assumptions over to the educators so they can make a buck on hardware, however, will have to assume some of the collective guilt.

At some point, there must be matrices in which the nature of relevant education and the nature of technology intersect, and this returns to Impacts A, B, and C. It is not within my competency to pinpoint these matrices. Rather, hoping to be suggestive and at risk of being vague, I would like to suggest some of the kinds of tests, paradoxes, approaches and questions that would have to be faced in such a process.

Suppose we decide the impact of technology on human life will be Impact A. Then, it becomes obvious that -- if humanism has any life left in it -- it is important students understand, and learn to manipulate, the basic principles and operations by which the computer will manipulate them. Before anyone gets exposed to programmed instruction, a thorough

appreciation of memory, time and perhaps set theory whould be essential. The first use of the computer in education should be the study of the ways in which computers handle the reality. Certainly if geometry and even calculus can be taught to elementary school children through new math, than they can learn how computers think or television patterns. They should be able to write programs and design systems, however simple. This suggests a first paradoxical law of technologized instruction: learning starts before the hardware is turned on.

It would be equally important to understand the limits of the computer. If the linear model of the computer which characterizes the first three generations is presumed to be the model which will continue to be most pervasive -- in which case the computer simply will lock in the industrial age -- students should learn the great deficiency of programmed instruction. That is, someone who has a brilliant reason why two and two make five gets the same treatment as someone who makes a dull error. Both get branched back to one plus one. Educators should learn the corrollary: computers only half-individualize instruction; they can tailor instruction to pace, but not to style.

Or, to give another example, let us envision a computer assisted course in rhetoric, and a particular lesson in making of metaphor. The program might assume that certain basic principles go into an effective metaphor for, say, a flower. To simplify, it may be determined that all good metaphors for flowers contain two elements: an animal and a color, which seem unrelated to flowers (thus having the element of surprise), but which in combination (according to some principle of association) definitely connect and expand on the idea of flower. All possible animals

and all possible colors become part of the program. Selections are made, according to the principles just described. The machine produces several metaphors. Some are better than others, but probably none will be any good. The question is "why?" At that point learning begins.

From such an example, one might extract a paradoxical law of CAI: learning begins when the computer stops.

If Impact B is determined the likely outcome, then computers themselves (or other media) should become the direct object of study as media. For if we are going to create the new paradigm that creates us, then we should understand that paradigm. (It's probably fair to say that the average high school graduate has never had a chance to study the Newtonian paradigm -- as opposed to memorizing it -- and is hence unable to articulate how it affects his life.)

Similarly, if we believe in Impact B, educators, before plunging into instructional technology, should at least play with some rather difficult questions. For instance:

--Are non-linear models of the computer (such as the parallel systems model) petentially more important to instruction than linear models?

--Where is the quest for new models of the computer? And where is it going?

--Will the computers reliance on the past be supplanted, through some new nodel, with reliance on the future? (i.e., what will a computer be like which relies on foresight rather than memory?)

--There is a curious kind of distance between the excitement implied by the language of computers (feedback, simulation, associative addressing, etc.), and the reality of the operation's these terms describe. What inhabits that distance?

Or if Impact C is the choice, a major effort whould be to have students learn about information systems: how to build them and how to use them (in a way they never learn how to use libraries). In this, (and in the other alternatives as well), the key characteristic is engagement - making the student an active learner, not a passive tutee. The hardware is not the master; the student is.

Whatever the impact of technology on education, the possibility of its diminishing human interaction and contact is obvious and real. Similarly, it will diminish opportunities to experience interdependence (as distinguished from dependence or independence). This is paradoxical because the rarest feats of the new technology -- space flights or heart transplants, for example -- are extraordinary examples of interdependent group accomplishments, just as communications media are increasingly creating a world community in which interdependence among nations is vital to survival. It is the more unfortunate because the style of American public education has generally prohibited any chance for students to learn how to function in groups. (The exception is, of course, the highly formalized group work of athletics.) The growing role of technology in instruction simply makes it more imperative that schools stop ignoring group behavior and individual behavior in groups. The technology, to stretch a word, of human behavior should itself be a key part of the curriculum. Certainly this means a growing emphasis on affective, as opposed to cognitive, development. It may mean tackling the issues of behavior head on in T-groups. Or tackling them indirectly through games. Stanley Kubrick has wryly warned us, in his movie, "2001", what happens in situations requiring interdependence when the group cannot function as a whole. That

Kubrick makes the neurotic a computer, rather than a person, is perhaps no more than an amusing way to suggest that technology does not relieve us, but only intensifies for us, this basic issue.

Anyone who looks at the behavioural assumptions embodied in school organizational structure, or who has attended a few education conferences, or administrative meetings, knows that the place to start in this endeavor may well be with some education for the educators.

It should be stressed that underlying the entire impact of technology on education -- and particularly the impact of the computer -- is the development of a new, sophisticated symbolic language, with both its own logic and its own relationship to "reality". In schools, we are just getting around to acknowledging in the curriculum that mathematics is a symbolic language. That English or any language is also a symbolic system is still generally obscured. (Perhaps because their teachers don't know it.)

Again, the growth of technology in education dramatized the need to address another shortcoming of the system as it exists.

The remedy for one problem often produces a new one. The question must be asked, what would be in the impact on students of dealing with a curriculum that is highly symbolic? Extensive symbolic manipulation can produce anxiety. Should there then be therapy in the schools? Or should, at the least, such subjects as art, music and writing be used as personal, creative ways of expressing and dealing with feelings and/or the environment. After all, this is what art is all about (although again that is not usually recognized in schools).

An equally basic question is, will it take longer than the existing 12-year period of schooling for students to acquire the kind of sophistication -- so far beyond what schools offer now -- suggested in this paper?

And what sort of sequence, what articulation, what continuity, should develop for the K-12 or K-? curriculum? It certainly does seem foolish to proceed with a dash of computer biology in the eighth grade, a little simulated economics in the fifth grade, some ITV in kindergarten and a little film-making in summer school -- which is the kind of slapdash, patchwork way instructional media are being introduced now. Tacking on gimmicks, the traditional approach to "innovations" in schools, won't create a revolution. Planning for systems change just might.

The kinds of questions posed here have been posed primarily in terms of computers. But they can, and should be, posed in terms of all forms of technology which impact on education.

Moreover, it should be acknowledged squarely by anyone facing the problems of technology and instruction that the grip of dead tradition on school systems is strong indeed. Perhaps instructional technology can be used to help break that grip -- although there is very little evidence to make one believe it is helping so far. Certainly it would be irresponsible to push for heavy investments into instructional technology without first addressing squarely not only the nature of those investments, but also the process by which systemic change will occur that make pay-off possible.

This is a tall order. It may seem rather Utopian, and rather beyond the purview of a Study of Instructional technology. But considerable experience and certainly the opinion of top leadership in the Philadelphia schools reinforce the gloomy opinion that nothing less than total overhaul will "save" education, particularly education in urban areas. And that should be everyone's business.

The following section of this paper switches gears, and no pretense at a graceful transition is made. From the general and the abstract, it will attempt to suggest some glimmerings, based on Philadelphia programs, of how instructional technology may make a difference in the future. There is a disparity between the cosmic task which has been sketched above, and the modest beginnings which will be described below. A disparity, but not, it is hoped, glaring inconsistency.

Some Uses of Technology in Philadelphia

Education needs new matephors -- new ways of looking at itself and organizing itself. Technology, or media, which technology becomes in instruction, can provide some of those new ways and can serve as a vehicle for changing not only the content of instruction, but the process, or behavior of those involved in teaching-learning.

Media in the classroom may range from a simple object (say a bag of beans used in a math laboratory) to a complex piece of hardware (a videotape machine, a computer). The Madison Math program is a good example of an instructional approach which uses its own technology to teach math, to provide different methods (manipulation of materials; playing games) of learning and, in the process, to change the relationship between teacher and student. Most simply put, Madison Math forces a teacher to stop meddling with the students and let them meddle with the materials. The students learn through meddling. (The teacher primarily assists and sets up possibilities for instruction; the student does the learning himself.) The teachers learn a new way -- a non-authoritarian way -- of operating a classroom. And the latter is really the "hidden agenda" of the Madison Math program.

This is to suggest that technology can be a change agent by its mere use. It can also be a metaphor, an organizing principle, a message, an environment, a catalyst, and, as McLuhan suggests, an extension of man.

In varying degrees, media is all these things in the Parkway Program -- a rather radical departure in secondary education which has just begun in Philadelphia.

The mile-long Benjamin Franklin Parkway is a broad, tree-lined mall that runs between City Hall and the Museum of Art. Along it are clustered many of the primary cultural institutions of the city -- the Franklin Institute (physical sciences) and its research laboratory; the Academy of Natural Sciences; the Rodin Museum; the Free Library. Nearby are the Zoo and Fairmcunt park.And within the radius of a half-mile or so of its center are the main institutions of government in the city (City Hall, County Court, the Board of Education); two penal institutions (one for youth, one for adults); the major transportation centers; several major corporate headquarters; some industry, a hospital, two colleges of art and a college of music, newspaper plants, television studios, and every kind of urban living condition, from townhouse to tenement to high-rise apartment.

This area is Philadelphia's newest high school. One hundred twenty students, chosen at random from over 2000 applicants, and representing a broad range of backgrounds, interests and scholastic achievement and aptitude, currently attend it. They are receiving their total educational program in the massive learning laboratory that the Parkway area has become, and they are helping plan the program that up to 2,400 students will receive there as the project expands in the next few years.

Available to them, chosen with the aid but not at the direction of the faculty, are courses offered by businesses, by the various institutions and by the faculty, in a broad range of subjects from vocational to traditional academic areas in the humanities, social studies and sciences, to offerings in urban affairs, multi-media journalism, and so forth. A student's own goals and projects are the organizing principle around which he or she selects among the offerings granted. There is a high degree of reliance on independent study. But group experiences (in seminar and counseling sessions) are built in. Time is allocated according to the needs of a particular course or a particular project -- not according to the arbitrary rigors of a roster. Indeed, the "technological tyrannies" of the average high school program -- time and space -- are replaced by near total flexibility. And the tyranny of the teacher is eliminated by permitting students to plan their own program. If they don't like a course, they don't take it. But they learn at the same time that the world has some givens, and there are certain things they must do to meet their own life goals.

In the Parkway Program, the city and its people quite literally become media. They are the object of study and the means of study and source of information. Students learn from, learn about and learn through them. The metaphor is media; the objective correlative is man. Technologies are studied, used and learned from primarily insofar as they contribute to this understanding of a society, its institutions and it workings.

John Bremer, director of the Parkway Program, argues strongly that the project is an idea, not a place. He maintains that almost any strip

of the city, a mile long and a half mile wide, has within it the full array of technologies, the potential to become a laboratory in which a full educational program can be executed.

Nonetheless, Philadelphia continues to build schools, and no doubt will. (The Parkway Program has a small headquarters in rented space, but no facility of its own.) The same concern for physical environment as a medium which not only helps shape instruction but should itself be an object of study is explicit in the North Philadelphia School Facilities Study, performed for the Board of Education by David Crane.

The Crane study accomplishes three major aims. First, it is a systemic analysis of the components of school buildings. Secondly, it suggests alternative ways to design, provide or construct those components which permit the school building itself to be "decentralized" so it blends into the contours and the overall physical development of a neighborhood (from transportation to business, to recreation, to health and other facilities); and thirdly, through reduction of a facility to its components and by simulating the process of design, it provides a workable way for community groups to engage in the complexities of designing a school for their neighborhood.

The Crane Study assumes that open and flexible space to permit a flexible instructional program is not enough. Rather, the technology of school design and construction must itself connect and be integrated into the total community environment. The technology of school construction thus can and should be viewed as inseparable from the instructional program itself and from its relationship to particular communities. The technology of environment is a part of the instructional program.

The Film/Media Center which operates in District Two, one of the city's eight subdistricts, is an example of a decentralized curriculum service unit which has as its explicit concern technology.

The media center is a resource for teachers, a resource for staff development and coordinates curriculum developed by teachers. Its program includes an emphasis on media (primarily film and television, although not exclusively) as a "content" area and a valid activity (student film-making, slide tapes, radio programs) in and of itself. But it also is developing an approach to media as an organizing principle for an educational program. The September, 1968 issue of "Media and Methods" describes one such approach developed at the media center in an article entitled "The Wheel: A Model for Multi-Media Learning."[4]

A "media wheel" can be used to teach almost any subject. It is based on the assumption that learning takes place in at least two phases -- an active phase in which the student produces, makes, shapes or processes information, and a reactive phase, in which the student receives information. A "media wheel" provides a progression of media for approaching the same topic for each phase. A typical wheel, for instance, uses six different media: the body (the senses, mime, improvisational drama); design (art graphics, constructions); sound (speech, noise, music); photography and the moving image, and print. All are media which people use everyday to learn. For some students, moreover, the pervasive learning medium in schools -- print -- is not by itself an adequate medium of instruction. It is a technology which requires a fairly high tolerance and appreciation of abstraction. The media wheel is a device to enable

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[4]By Murray Suid, Roberta Suid and James Morrow.

different perspectives on a given lesson. It seeks to utilize and approximate the full range of methods available and natural to learning. And, again, stress is placed on student involvement(through media).

The development of the 12th and Oxford Street Gang from a street-corner gang to a diverse, if fledgling, corporation, illustrates the utility of media as a catalyst -- a point of entry -- into learning. The School District can take no credit for the evolution of this group, but its relevance as an educational model is undeniable.

A few years ago, an enterprising youth worker began to work with about thirty members of this gang -- a group of kids with police records, a history of gang killings, and unsatisfactory school performance, if they still happened to be in school -- typical of much gang youth.

The worker got the idea of putting a movie camera in their hands. They began to play around with it. After a while they decided to make a film. With the assistance of a television cameraman from a local TV station, they did. The film produced, "The Jungle," has since been shown on television; has won an award at a New York Film Festival; and has been shown in this country and abroad. The gang is at work now on its second and third films, under contract and for money.

In the process, some remarkable metamorphoses took place within the gang itself. The 12th and Oxford Street Gang has become the 12th and Oxford Street Corporation. They are legally incorporated. And in the process of forming a film company, several things happened to the gang members:

First of all, they wanted to do it themselves. So, they found out that there were some very basic steps they had to take. They needed to

understand law, and this meant reading and learning something about the legal structures of our society. They needed to be able to handle accounts. This meant math. They needed to develop high level competencies within the group in a variety of fields connected with film-making: script writing, film editing and processing, sound effects, lighting effects, equipment repair and the like. A number of them went back to school to sharpen up on these very skills. Others came in contact with lawyers, with accountants, and with a variety of professionals from the communications industry, and they learned first hand, from real professionals doing the real thing.

Not surprisingly, some of the gang members began to develop other interests, particularly in small businesses, such as laundromats, and in housing renewal and rehabilitation. The idea of the corporation expanded, and a federal grant of $170,000 gave in impetus to this broader range of projects, which the gang is now undertaking, and for which various members are acquiring the necessary skills. As an end result, the 12th and Oxford Film-Making Company is now a subsidiary of the 12th and Oxford Corporation.

This narrative condenses substantially the development of the 12th and Oxford group, but it should suggest several basic principles about an approach to education that is organic, that starts with the student and provides him a chance to grow and explore and learn in ways relevant to himself.

Moreover, it may suggest one of the virtues of at least one technology. Archimedes declared that given a place to stand on, he could move the world (with a lever, of course). The camera and the medium of film gave the 12th and Oxford group "a place to stand on", something which quite

literally enable them to put their lives in focus. Perhaps this was just luck. But perhaps it is no accident that the camera provides a concrete way of ordering and, in a sense, controlling one's environment. Moreover, making a movie about themselves gave the members of the group a chance to analyze their own behavior, their own values, and come to some conclusions about it. Without this chance, they might still be on the streets.

The 12th and Oxford "model" does present an anti-institutional approach to education. Its spontaneity may be more than one can reasonably expect in schools. But the area of gaming and simulation can be very useful in approximating the same sort of process. Games are, of course, a kind of technology themselves. And other technologies can be helpful in either the presentation of the game or in deepening the understanding of the game.

At the Pennsylvania Advancement School, gaming is a major strategy for reaching underachievers -- such games as the Life Careers Game or the Consumer Game developed at John Hopkins, or the "race game" of Western Behavioural Sciences, Inc. The Advancement School has concluded that games sharpen cognitive development in a variety of ways: they provide a frame of reference which enable students to pull together pieces of information that otherwise were floating -- perhaps semiforgotton -- and not apparently relevant to the student. In other words, they help a student make knowledge useful. New (or renewed content) becomes arresting because it is related to an experience. Games develop the ability to make strategic decisions, comprehend relationships (cause-effect or inter-relation of components of a system), and they demand planning. Moreover, a good game strongly involves even "unreachables" and involves them actively.

Finally, games like the "race game" provide a powerful series of experiences which teach them about power, group behaviour and individual behaviour as it is affected by group membership.[5]

Some work, here and elsewhere, has of course gone into the programming of these and similar games. Extremely sophisticated simulations, of course, become possible through the use of computers, and there is enthusiasm in Philadelphia for their instructional role. Closed circuit television has been used at P.A.S. and elsewhere in the system, particularly to record games which emphasize behavior, and, here as elsewhere, has been found an effective way to give students feedback and a chance to study in depth both themselves and the group. Similar use of closed circuit television has been made in improvisational dramatics and role-playing, as developed by the Advancement School and the Philadelphia Research Project in Affective Development, to get at issues of human behaviour in the classroom.

Finally, it should be noted that Philadelphia has invested several million dollars in computer assisted instruction of the sort disparaged in the first section of this paper. But even CAI has its place in the galaxy of instructional technology. It is merely that it should be recognized as performing the most menial function of education and should have a place only if it has its proper place in a redefined educational context.

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[5] These games are both well-known and easily available. It would require too much space to describe their workings.